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Tavares, Fabio Lúcio; Leite, Franciele Marabotti Costa; Lima, Eliane de Fátima Almeida; Cade, Nagela Valadão; Coelho, Maria José

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Federal University of Rio de Janeiro State



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## RESEARCH

### Homens e acidentes motociclisticos: gravidade dos acidentados a partir do atendimento pré-hospitalar

Men and motorcycle accidents: severity of casualties from the prehospital care

Los hombres y los accidentes de motocicleta: gravedad de las víctimas de la atención pre-hospitalaria

Fabio Lúcio Tavares <sup>1</sup>, Franciele Marabotti Costa Leite <sup>2</sup>, Eliane de Fátima Almeida Lima <sup>3</sup>, Nagela Valadão Cade <sup>4</sup>, Maria José Coelho <sup>5</sup>

#### ABSTRACT

**Objective:** This study aimed to characterize the severity of men victims of motorcycle accidents. **Method:** a transversal study of quantitative approach and descriptive analysis. A total of 901 official reports of the Mobile Emergency Care of Espírito Santo/Brazil were analyzed. **Results:** the excoriation (44.66%), the cut-blunt injury (21.94%), fractures and traumatic amputation (12.45%) were the most frequent types of injury; the lower limbs (40%), the skull and cervical spine (9.41%) were the most affected segments of the body; 6 deaths occurred at place of accident (0.66 %). **Conclusion:** It is concluded that motorcycle accidents are a major health problem of man, not only because of the frequency they occur, but also mainly because of the severity of lesions generated by this type of accident, confirming the importance of the preparation of nurses involved in care and adoption of preventive measures. **Descriptors:** External causes, Motorcycles, Men's health.

#### RESUMO

**Objetivo:** Caracterizar a gravidade de homens acidentados de motocicleta, atendidos no serviço móvel pré-hospitalar. **Método:** estudo descritivo, transversal, com abordagem quantitativa. Foram analisados 901 Boletins de Ocorrência do Serviço de Atendimento Móvel de Urgência do Espírito Santo/Brasil, no período de janeiro a março de 2012. **Resultados:** A excoriação (44,66%), o ferimento corto-contuso (21,94%), a fratura e a amputação traumática (12,45%) constituíram os tipos mais frequentes de lesão; os membros inferiores (40%), o crânio e a coluna cervical (9,41%) foram os segmentos do corpo mais atingidos; ocorreram 6 óbitos no local do acidente (0,66%). **Conclusão:** os acidentes motociclisticos representam importante problema de saúde do homem, não apenas pela frequência com que ocorrem, mas principalmente pela gravidade das lesões geradas por esse tipo de acidente, confirmando a importância do preparo dos profissionais de saúde envolvidos no atendimento e na adoção de medidas preventivas. **Descritores:** Causas externas, Motocicletas, Saúde do homem.

#### RESUMEN

**Objetivo:** caracterizar la gravedad de los heridos hombres motocicleta. **Metodo:** un estudio transversal, de enfoque cuantitativo y de análisis descriptivo. Se analizaron 901 informes oficiales de la Atención Móvil de Urgencia del Espírito Santo/Brasil. **Resultados:** la excoriación (44,66%) , la lesión de corte romo (21,94%), fracturas y amputación traumática (12,45%) fueron los tipos más frecuentes de lesiones; los miembros inferiores (40%), el cráneo y el columna cervical (9,41%) fueron los sectores más afectados de la carrocería; 06 muertes ocurrieron en el lugar (0,66%). **Conclusión:** los accidentes de motocicleta son un importante problema de salud del hombre, no sólo por la frecuencia con la que se producen, pero principalmente por la gravedad de las lesiones generadas por este tipo de accidente, lo que confirma la importancia de la preparación de las enfermeras involucradas en el cuidado y adopción de medidas preventivas. **Descriptores:** Enfermería de urgencias, Motocicletas, Salud de los hombres.

<sup>1</sup> Master in Public Health. College Professor at the Department of Nursing at the Federal University of Espírito Santo (UFES). Vitoria, Espírito Santo, Brazil. E-mail: fabiotavares54@hotmail.com <sup>2</sup> Master in Public Health. College Professor at the Department of Nursing at the Federal University of Espírito Santo (UFES). Vitoria, Espírito Santo, Brazil. E-mail: francielemarabotti@gmail.com <sup>3</sup> PhD in Nursing. College Professor at the Department of Nursing at the Federal University of Espírito Santo (UFES). Vitoria, Espírito Santo, Brazil. E-mail: elianelima66@gmail.com <sup>4</sup> PhD in Public Health. College Professor at the Department of Nursing at the Federal University of Espírito Santo (UFES). Vitoria, Espírito Santo, Brazil. E-mail: nagelavc@terra.com.br <sup>5</sup> PhD in Nursing. Associate Professor of the Fundamental Nursing Department and the Program for Graduate Nursing Anna Nery School, Federal University of Rio de Janeiro. E-mail: zezecoelho@yahoo.com.br

## INTRODUCTION

In recent decades, studies have pointed out the external causes as a serious health problem representing a significant cause of death in the world and the population, especially the young men.<sup>1-3</sup>

In the context of this social reality and seeking to tackle this problem, the Ministry of Health launches in 2009 Attention National Policy Integral to Men's Health, with the purpose of promoting health actions that can contribute to the understanding of masculine singular reality in its various socio-cultural and political-economic contexts, with attention to increasing life expectancy and reducing preventable morbidity and mortality rates of that population.<sup>4</sup>

The National Policy for Integral Attention to Men's Health shows the external causes like worrying indicator of morbidity and mortality among Brazilian women, especially for the age group 25-59 years in which it is observed that external diseases appear as the leading cause of death with numbers higher than for circulatory diseases and malignant neoplasms.

According to the World Health Organization (WHO), external causes can be classified as intentional (assault, homicide, suicide, among other causes) and accidental, including, in this group, falls, poisoning, drowning and suffocation, work accidents and traffic. From these, traffic accidents accounted for about 1.2 million deaths and injuries were the cause of between 20 and 50 million people in 2010, with increasing emphasis on motorcycle accidents.<sup>5-6</sup>

The growing need for urban and rural mobility, low coverage and low quality of mass transportation in the country, still associated with the advantages of low cost of acquisition and maintenance of a motorcycle and agility that it provides when it is compared to a car, motorcycle is preferably a means of transport, with an increase of its use in work activities.<sup>7-8</sup>

Despite all the advances made by modern vehicle designs and safety equipment, inequality in protective conditions, or their greater exposure on the roads compared to users of other vehicles, making motorcycle accidents more serious, especially in the statistics of traffic accidents to cause serious injury and death.<sup>9-10</sup>

Thus, to know the details of this complaint, the first step is the description of how this phenomenon occurs and the importance in achieving the greatest amount of information possible in order to gather systematically data on the extent, characteristics and the consequences of this health problem.<sup>11</sup>

Given the above, this study aimed to characterize the severity of motorcycle injured men, treated at Mobile Emergency Care.

## METHOD

It is a descriptive, transversal study, with quantitative approach, performed at SAMU-ES, which consists of one Emergency Medical Regulation Center located in Vitória, and ten decentralized basis, distributed in the metropolitan area of Greater Victoria and in the state, making the coverage of pre-hospital care in the interior regions.

We sampled all the accident reports, duly completed, which involves male victims of motorcycle accidents, assisted by SAMU-ES in the period from January to March 2012. The reports were excluded whose service was canceled by the Medical Regulation when the victim had evaded the crash site, for early removal, incomplete report or illegible handwriting, as well as accident reports of fatal motorcycle accidents. The months were chosen at random because of the regularity of monthly care of trauma victims during the year.

For data collection, the official reports of Mobile Emergency Care, generated by SAMU, were used. Information was collected from the manual consultation of all daily service bulletins in the period established in this study and transcribed for a specific instrument developed by researchers with the following variables: type of injury; anatomic location of the lesion; eat-level agreement with the Glasgow Coma Scale (GCS) <sup>12</sup>; respiratory conditions; level of systolic blood pressure, measured through auscultation; suspected spinal trauma; and procedures on pre-hospital care. The data were stored in the database in Microsoft Excel software and analyzed using simple descriptive statistics, using STATA 12.0 program. The results, in turn, were presented in the form of tables, using absolute and relative frequency.

The survey followed the criteria of the resolution of the National Health Council (CNS) 466/2012, was approved by the Research Ethics Committee (CEP) of the Health Sciences Center of the Federal University of Espírito Santo (Opinion n° 148 876 28/11/2012) and was authorized by the Department of Health of Espírito Santo.



RESULTS AND DISCUSSION

SAMU-ES conducted 8,419 visits, generating accident reports of Pre-hospital care, between January and March 2012. The analysis of these reports showed that 1,514 incidents were motorcycle accidents, which amounts to 18% of all causes of emergency room visits. From the 1,514 reports analyzed, 474 were excluded (31%), which did not meet the inclusion criteria of this research. From 1040 reports that met the inclusion criteria, 907 were referred the service for men who are victims of motorcycle accidents (87%).

From the total of 901 men, six ones (0.66%) lost their lives in motorcycle accidents, according to the SAMU-ES data in the period January-March 2012, and the police reports regarding these services were excluded from the sample, since only contained in the bulletins registration of the death circumstances of victims, without giving the details of the injuries. However, these six deaths were considered in assessing the context of gravity of the victims.

The epidemiological survey of 901 police reports revealed that, in relation to the type of injury, from 1,518 recorded injuries resulted from motorcycle accidents in men: 678 were of type 'galling', which amounts to 44.66% of injuries; followed by 'cut and blunt injury', with 333 registrations (21.94%); 'Injury', with 268 occurrences (17.65%); 'closed fracture' with 135 occurrences (8.89%); 'Compound fracture' with 46 records (3.03%); 'Amputation', eight occurrences (0.53%); and in the 'other types of injury' group 50 records found (3.30%) (Table 1).

Table 1 - Characterization of the type of injury in men victims of motorcycle accidents, assisted by SAMU, Espirito Santo, from January to March 2012.

Variable	Absolute frequency (n)	Relative frequency (%)
Lesion type		
Excoriation	678	44,66
Cut and blunt	333	21,94
Bruising	268	17,65
Closed fracture	135	8,89
Compound fracture	46	3,03
Traumatic amputation	08	0,53
Other types	50	3,30
Total	1518	100,00

According to the distribution of lesions, considering the affected body part (Table 2), emphasis is given to the lower and upper limbs, which occurred in 1663 lesions (77.85%), distributed as follows: 430 in the left lower limb (20, 13%), 422 in the right leg (19.76%), 407 in the left arm (19.05%) and 404 in the right arm (18.91%). The region of the skull and cervical lesions amounted to 201, totaling 9.41% of total lesions, followed by chest injuries with 106

(4.96%), with the abdomen 61 (2.86%), pelvis 56 (2.62%) and back with 49 (2.29%). We did not find injury record in the genital and perineal regions.

Table 2 - Characterization of the location of the lesions in men victims of motorcycle accidents, assisted by SAMU, Espirito Santo, from January to March 2012.

Variable	Absolute frequency (n)	Relative frequency (%)
Injured area of body		
Left leg	430	20,13
Right leg	422	19,76
Left arm	407	19,05
Right arm	404	19,91
Skull and Cervical	201	9,41
Chest	106	4,96
Abdomen	61	2,86
Pelvis	56	2,62
Dorse	49	2,29
Total	2136	100,00

From the perspective of the initial neurological examination of the victim, according to ECG12 applied by professional SAMU-ES to reach the crash site, and shown in Table 3, 764 victims (84.80%) received 15 points, followed 25 victims (2.78%) who received 14 points. The receiving score between 13-10 points totaled 10 victims (1.1%) and those who received between 8:07 points totaled 3 victims (0.33%). In 10.98% of cases, totaling 99 victims, there was no record of the victim's level of consciousness.

Table 3 - Characterization of the level of consciousness, according to ECG victims of motorcycle accidents, assisted by SAMU, Holy Spirit, from January to March 2012.

Variable	Absolute frequency (n)	Relative frequency (%)
Glasgow Coma Scale		
15 points	764	84,80
14 points	25	2,79
13 points	5	0,55
12 points	2	0,22
11 points	1	0,11
10 points	2	0,22
08 points	2	0,22
07 points	1	0,11
Ignored	99	10,98
Total	901	100,00

The study found that from the respiratory and circulatory conditions of the victims, 800 men were breathing spontaneously natural air (88.79%), with about 20 breaths per minute, and presented by pulse oximetry a partial saturation of oxygen around 97%. The average systolic blood pressure measured at the crash site was 127 millimeters of mercury. The average heart rate, measured by palpation of the carotid or radial artery, was 100 beats per minute.

The verification of the suspected spinal cord injury (SCI) in 875 reports (97.11%), there was no information of possibility, or not, that the victim has suffered TRM contained in the specific field to the record of this clinical situation. In three bulletins (0.33%) there is a suspect of TRM and 23 (2.55%) contained no suspicion of the risk of TRM.

From January to March 2012, the SAMU-ES 3652 performed procedures in pre-hospital care (Table 4) for the men victims of motorcycle accidents. These procedures were: 896 (24.53%) of measurement of vital signs; 877 (24.01%) of realization of oxygen saturation by pulse oximetry; 573 (15.70%) of cervical immobilization application through the cervical collar; 545 (14.93%) of use of the long board for rugged transportation; 457 (12.51%) of performing peripheral venipuncture; 134 (3.67%) of compressive dressing; and 104 (2.85%) immobilization of lower and upper limbs.

Table 4 - Characterization of the procedures provided for victims of motorcycle accidents, the SAMU, Espírito Santo, from January to March 2012.

Variable	Absolute Frequency (n)	Relative frequency (%)
Procedures		
measurement of vital signs	896	24,53
pulse oximetry	877	24,01
Cervical collar application	573	15,70
Use of long board	545	14,93
Peripheral venipuncture	457	12,51
Compressive dressing	134	3,67
Immobilization of limbs	104	2,85
Other	66	1,80
Total	3652	100,00

Corroborating the data from the scientific literature on the subject and confirming the social problem of motorcycle accidents among men, our study reveals the worrying state of Espírito Santo men. The data observed in this study meet a new reality of the Brazilian traffic and emergency care, in which stands out in recent decades an increasing number of victims, especially men involved in motorcycle accidents associated with the large elevation the fleet of this type of vehicle.<sup>13-14</sup>

In Espírito Santo, as in other states, it is important to spread the use of motorcycles as a means of transport. According to the Department of Transit of Espírito Santo (DMV-ES), in 2004, there were 161,417 motorcycles and that number rose to 350,894 motorcycles in 2012, an increase of 54% in the fleet of this type of vehicle in almost a decade, 981 motorcycles for 10,000 inhabitants in 2012.<sup>15</sup>

For the motorcycle driver, exposure and consequent absorption of the kinetic energy of their entire body surface for trauma make it extremely vulnerable in this type of accident, which usually has a multifactorial origin, including: motorcycles stored; conservation status of public roads; signage; speed of the vehicles involved; visibility; traffic conditions; influence of rain; compliance with legislation and enforcement; and human factor.<sup>16</sup>

This study revealed that the excoriation (44.66%) and the cut and blunt injury (21.94%), followed by injury (17.65%), closed fracture (8.89%) and open fractures (3, 03%) were the most frequent types of injury among injured men. These injuries are directly related to the biomechanics of the motorcycle accident which is characterized with the energy of the shock which is absorbed by the body surface of the rugged and often the throwing down. Projected victims suffer beyond the impact of the crash, the collision against the ground, often followed by slippage, which increases the likelihood of serious injury and need of hospitalization.<sup>17</sup>

It is important to consider the possibility to have occurred some intermediate impact with the victim's body on the path between the motorcycle and the ground, as against the windshield and hardware of the car involved in the accident or against the handlebars of the motorcycle.<sup>10</sup>

It is noteworthy that superficial wounds such as abrasions and bruising may be associated with deep tissue damage, undetected at the time of the accident, requiring a more detailed diagnosis what the pre-hospital care does not have it. In addition, skin break with injuries, as in cases of abrasion and cut and blunt injury, may be a risk of bleeding and infection. Since the fractures, increases the risk of osteomyelitis, sepsis and bone necrosis, moreover, exposed tendons become necrotic and dried, and exposed blood vessels are at risk of rupture, by increasing the severity of accident.<sup>17</sup>

In cases of injury at chest and abdomen, it may cause lung, heart and abdominal organs injuries, determining important internal bleeding, with consequent shock frame and death.

Although to a lesser extent of occurrence, traumatic amputation (0.53%) is a fact of great concern because of the seriousness of the situation. Eight men had some body segment lost by accidental injury within three months. This tragic situation, as well as being associated with greater severity of rough, due to the risk of bleeding, shock and infection, is directly related to impairment of autonomy and self-esteem, causing impotence and dependence on individual.<sup>18</sup>

Regarding the anatomical location of the lesion, most investigated in this study had crashed commitment of the lower limbs (39.89%). These data are similar to those found for the most studies.<sup>7,10,11</sup> Lesions in the lower limbs are related to long hospital stay associated with a greater functional impairment of victim.<sup>14,16,18</sup> Moreover, the regions of the skull and cervical are reached, such as traumatic brain injury and spinal cord injury, 9.41% of our sample point to the risk of neurological injury with disabling sequelae such as pain syndromes and partial functional disability or total.<sup>19</sup>

With regard to suspected spinal cord injury, we did not find enough records to do a situation analysis. The fact that there is not records on uncertain of this type of injury in 97.11% of the service bulletin draws attention to the importance of maintaining an ongoing



program of continuous education about the value of information generated by health services for the implementation of public health policies.

Several trauma indexes can be used to assess the severity of the accident victim. These indexes are scoring systems designed to assess the physiological changes, severity of anatomic injuries and the probability of survival of injured patients.<sup>20</sup>

SAMU-ES uses the ECG to establish the neurological condition of the victim. This scale allows, in addition to infer about neurological conditions, survival probability forecast and sequelae of victim.<sup>10,20</sup> The value of ECG and systolic blood pressure and respiratory rate allows the rescuer, after a simple score, in estimating the severity of the victim at the accident site through the Revised Trauma Score (RTS).<sup>20</sup>

By using the means of ECG (15 points), systolic blood pressure (127 mmHg) and respiratory rate (20 breaths per minute) of the victims analyzed in this study, we can infer that, in general, the RTS was equal to 12 points, determining a probability of survival of 98%.

Another severity index, called Injury Severity Score (ISS),<sup>20</sup> classified as anatomical by taking into account the injuries in the various segments of the body, can also be used, however the severity of anatomic lesions is determined by physical examination, radiological tests, surgery and autopsy, obviously it is not possible implementation in the pre-hospital care.

Thus, it is important to note that while the RTS is an excellent score of severity rating in trauma because of the speed and ease of application, serving as a screening method in pre-hospital care, such an index does not consider the consequences and complications resulting from trauma, since several clinical developments may occur with the victim in hospital care after the rescue.

Regarding the analysis of procedures performed in the pre-hospital care by the SAMU-ES, although we have categorized the procedure according to the professional who carried it out, clearly the performance is the rescuer or nursing staff responsible in most cases for performing these techniques.

SAMU-ES performed 3652 procedures in response to motorcycle accident victims men in the period from January to March 2012 and almost in all attended (896; 99.44%) they had measured vital signs including respiratory and heart rate counting, through the carotid or radial pulse, and the blood pressure measurement. Furthermore, the type of breathing was observed, if it is spontaneous or artificial, into ambient air or if they needed installation of oxygen support.

The assessment of vital breathing and circulation parameters is an important and compulsory measure of primary assessment of the victim, so it is possible to diagnose early, by changing detection of these signals, conditions that put lives at risk, enabling immediate intervention.<sup>20</sup>

Immobilization through the cervical collar of application, the use of long board and limb immobilization are standard procedures considered in the pre-hospital care, performed both in the presence of osteo-articular injury confirmed by the primary examination, as the suspect based on the trauma mechanism and the complaint of victim.<sup>10</sup>

From the total procedures, 457 (16.58%) were about the realization of circulatory support procedure with peripheral venous puncture and volume replacement. This procedure is primarily used with the objective of preventing or reversing the installation of hemorrhagic hypovolemic shock in trauma patients. To perform peripheral venous puncture in the road, in such adverse situation as a motorcycle accident scene, surrounded by anguish and the victim's pain, as well as curious people who stop to accompany what is happening, makes clear the degree of complexity of the actions held in pre-hospital rescue.

The pressure dressing, in this study accounting for 4.86% of the procedures performed ( $n = 134$ ), is also measured in bleeding control and prevention of the victim's aggravation with cut-blunt wound and with involvement of blood vessels.

## CONCLUSION

Motorcycle accidents, in the frequency of occurrence and severity of victims involved, pose a problem for contemporary society, especially for men's health; a challenge for health managers and a great mission for health professionals, not just for those who work in the pre-hospital care and emergency rooms, but also for those who work in the primary and tertiary levels of health care.

The biggest social commitment of professional rescuers is at the meeting with these men victims of accidents, helping and transporting them safely and rehabilitating them as best as possible so that they can return to the previous daily life to the accident. This contributes to society, to the extent that work intensively in serving this population in serious health conditions, not only in the acute context, at the accident scene, but also the risks of sequels and disabilities resulting from the trauma.

It is noteworthy that to operate in this context amounts to intervene from the time prior to the accident, towards the organization and planning of pre-hospital care, through the redemption on public roads and safe transportation to the hospital, keeping the service throughout intra-hospital flow for the victim that continues during hospitalization and after discharge, through the actions in primary care and the Family Health Strategy and physical rehabilitation centers, in order to contribute to the return of these men to society and daily life, interrupted by the accident.

We hope that this study may contribute towards elucidating the problem of motorcycle accident victim men, since knowing the victim of gravity profile, we can plan health actions based on quality service, directed to the real needs of victims.

We also hope that these data can contribute to the dialogue regarding the National Policy for Integral Attention to Men's Health and the problem of motorcycle accidents as existing in our society.

## REFERENCES

1. Malta DC, Cezario AC, Moura L. A construção da vigilância e prevenção das doenças crônicas não transmissíveis no contexto do Sistema Único de Saúde. *Epidemiol Serv Saúde* 2006; 15(1):47-65.
2. World Health Organization (WHO). Non communicable disease: Country Profiles 2011. [página da Internet]. [acessado 2014 abr 23]. Disponível em: [http://www.who.int/topics/chronic\\_diseases/en](http://www.who.int/topics/chronic_diseases/en)
3. Schmidt MI, Duncan BB, Silva GA, Menezes AM, Monteiro CA, Barreto SM, et al. Chronic non communicable diseases in Brasil: burden and current challenges. *The Lancet* 2011; 377(9781):1949-1961.
4. Ministério da Saúde (Brasil). Secretaria de Atenção à Saúde, Departamento de Ações Programáticas e Estratégicas. Política Nacional de Atenção Integral à Saúde do Homem: Plano de Ação Nacional. Brasília: MS; 2009.
5. Organização Mundial da Saúde. Manual de classificação estatística internacional de doenças e problemas relacionados à saúde. 10a Revisão. Volume 1. São Paulo; 1993.
6. World Health Organization (WHO). Global status report on road safety 2013: supporting a decade of action. Luxembourg: WHO; 2013.
7. Silva PHNV, Lima MLC, Moreira RS, Souza WV, Cabral APS. Estudo espacial da mortalidade por acidentes motociclísticos em Pernambuco. *Rev. saúde pública* 2011; 45 (2): 409-15.
8. Martins CGB. Acidentes na infância e adolescência: uma revisão bibliográfica. *Rev Bras Enfermagem* 2006; 59(3): 344-8.
9. Clarke DD, Ward P, Bartle C, Truman W. The role of motorcyclist and other driver behavior in two types of serious accident in the UK. *Accid Anal Prev.* 2007(5):974-81.
10. Malvestio MAA, Sousa RMC. Indicadores clínicos e pré-hospitalares de sobrevivência no trauma fechado: uma análise multivariada. *Rev. esc. enferm. USP* [Internet]. 2010 June [cited 2014 Apr 08] ; 44( 2 ): 352-359. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0080-62342010000200016&lng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342010000200016&lng=en). <http://dx.doi.org/10.1590/S0080-62342010000200016>.
11. Silva PHNV, Lima MLC, Moreira RS, Souza WV, Cabral APS. Estudo espacial da mortalidade por acidentes motociclísticos em Pernambuco. *Rev. saúde pública* 2011; 45 (2): 409-15.
12. Teasdale G, Jennett B. Assessment of coma and impaired consciousness: a practical scale. *Lancet* 1974;2:81-84.
13. World Health Organization (WHO). Global status report on road safety 2013: supporting a decade of action. Luxembourg: WHO; 2013.
14. Vieira RCA, Hora EC, Oliveira DV, Vaez AC. Levantamento epidemiológico dos acidentes motociclísticos atendidos em um Centro de Referência ao Trauma de Sergipe. *Rev Esc Enferm USP*; 2011 45(6): 1359-63.

15. Departamento de Trânsito do Espírito Santo (DETRAN-ES). Anuário Estatístico 2012. Disponível em <http://www.detran.es.gov.br/default.asp>. Acesso 11 abr 2014.
16. Debieux P, Chertman C, Barbachan NS, Dobashi E, Fernandes HJA. Lesões do aparelho locomotor nos acidentes com motocicleta. *Acta Ortop Bras* 2010; 18(6):353-6.
17. Castro RRM, Ribeiro NF, Andrade AM, Jaques BD. Perfil dos pacientes da enfermagem de ortopedia de um hospital público de Salvador-Bahia. *Acta Ortop Bras*. 2013;21(4):191-4.
18. Unwin J, Kacperek L, Clarke C. A prospective study of positive adjustment to lower limb amputation. *Clin Rehabil*. 2009;23(11):1044-50.
19. Brito JMPX. Incapacidade por traumatismo raquimedular secundário a acidente de trânsito. *Coluna/Columna* 2011;10(3):175-8.
20. Bordini AL, Luiz TF, Fernandes M, Arruda WO, Teive HAG. Coma scales: a historical review. *Arq Neuropsiquiatr* 2010; 68(6):930-937.



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Contact of the corresponding author:  
Fabio Lúcio Tavares  
Universidade Federal do Espírito Santo - Departamento de Enfermagem  
Av. Marechal Campos, 1468, Maruípe  
CEP: 29040-090. Vitória (ES), Brasil